

[0061]

CLAIMS

We claim:

1 1. In a method of patterning a layer of photoresist which has been applied over a
2 photomask substrate and exposed to imaging radiation, the improvement comprising
3 exposing said imaged photoresist to a vacuum for a period of time sufficient to allow pattern
4 critical dimensions to equilibrate across said photoresist, at a process chamber pressure
5 ranging from about 5×10^{-6} mTorr to about 5 mTorr.

1 2. A method in accordance with Claim 1, wherein exposure of said imaged
2 photoresist to said vacuum is performed at a substrate temperature within the range of about
3 18°C to about 60°C, for a period of time within the range of about 10 minutes to about
4 70 hours.

1 3. A method in accordance with Claim 2, wherein exposure of said imaged
2 photoresist to said vacuum is performed at a substrate temperature within the range of about
3 18°C to about 40°C, for a period of time within the range of about 20 minutes to about
4 12 hours.

1 4. A method in accordance with Claim 1, wherein said radiation is e-beam radiation.

1 5. A method in accordance with Claim 1, wherein said radiation is optical radiation.

1 6. A method in accordance with Claim 1, wherein exposure of said imaged
2 photoresist to said vacuum is performed prior to the performance of a post-exposure bake
3 process.

1 7. A method in accordance with Claim 1, wherein said exposure of said imaged
2 photoresist to said vacuum is performed prior to development of said photoresist to create
3 a pattern having openings through said photoresist layer thickness.

1 8. In a method of patterning a layer of photoresist which has been applied over a
2 photomask substrate, exposed to imaging radiation, and developed to create a pattern having
3 openings through said photoresist layer thickness, the improvement comprising exposing
4 said developed photoresist to a vacuum at a substrate temperature within the range of about
5 20°C to about 60°C for a period of time within the range of about 10 minutes to about
6 60 minutes, at a process chamber pressure ranging from about 5×10^{-6} mTorr to about 5
7 mTorr.

1 9. A method of patterning a layer of photoresist which has been applied over a
2 photomask substrate, comprising:

- 3 a) post-apply baking said photoresist;
4 b) exposing said photoresist to imaging radiation;
5 c) exposing said imaged photoresist to a vacuum for a period of time
6 sufficient to allow pattern critical dimensions to equilibrate across said photoresist, at a
7 process chamber pressure ranging from about 5×10^{-6} mTorr to about 5 mTorr;
8 d) post-exposure baking said imaged photoresist; and
9 e) developing said imaged photoresist to create a pattern having openings
10 through said photoresist layer thickness.

1 10. A method in accordance with Claim 9, wherein exposure of said imaged
2 photoresist to said vacuum is performed at a substrate temperature within the range of about
3 18°C to about 60°C, for a period of time within the range of about 10 minutes to about
4 70 hours.

1 11. A method in accordance with Claim 10, wherein exposure of said imaged
2 photoresist to said vacuum is performed at a substrate temperature within the range of about
3 18°C to about 40°C, for a period of time within the range of about 20 minutes to about
4 12 hours.

1 12. A method in accordance with Claim 9, wherein said radiation is e-beam radiation.

1 13. A method in accordance with Claim 9, wherein said radiation is optical radiation.

1 14. A method in accordance with Claim 9, wherein said method further includes the
2 following step:

3 f) exposing said developed photoresist to a vacuum at a substrate
4 temperature within the range of about 20°C to about 60°C for a period of time within the
5 range of about 10 minutes to about 60 minutes, at a process chamber pressure ranging from
6 about 5×10^{-6} mTorr to about 5 mTorr.

1 15. A method of patterning a layer of photoresist which has been applied over a
2 photomask substrate, comprising:

3 a) post-apply baking said photoresist;
4 b) exposing said photoresist to imaging radiation;
5 c) post-exposure baking said imaged photoresist;
6 d) developing said imaged photoresist to create a pattern having openings
7 through said photoresist layer thickness; and
8 e) exposing said developed photoresist to a vacuum at a substrate
9 temperature within the range of about 20°C to about 60°C for a period of time within the
10 range of about 10 minutes to about 60 minutes, at a process chamber pressure ranging from
11 about 5×10^{-6} mTorr to about 5 mTorr.

1 16. A method in accordance with Claim 15, wherein said imaging radiation is e-beam
2 radiation.

1 17. A method in accordance with Claim 15, wherein said imaging radiation is optical
2 radiation.